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EXAMINER

VU, DAVID

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



## **DETAILED ACTION**

### **Continued Examination Under 37 CFR 1.914**

1. A request for continued examination under 37 CFR 1.114, including the, fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 04/11/08 has been entered.

### **Election/Restrictions**

2. Applicant's election without traverse of Species II, fig. 6 (Claims 19-24 and 27-30) on 08/05/2008 is acknowledged.

Claims 11, 13, 15-18, 25 and 26 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made without traverse in the reply filed on 07/30/2008.

3. Examiner would like to point out that the limitations in Claim 22 (step (d)) toward the process of forming a trench which are not present in the elected Species II, Fig. 6 since "The major difference between the first and second embodiments of the present invention is that no masking step is performed in the second embodiment of the present invention" (see Specification [0033]). As for Claims 19 – 21, 23, 24 and 27-30, these are also toward the Non-Elected Species since they depend on Claim 22.

### **Claim Rejections - 35 USC § 112**

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 19-24 and 27-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The original disclosure does not include teaching “after said removing of said layer of said layer of said fill material, said fill layer of material thicker over said planarization stop layer between adjacent trenches of said first set of trenches then over said fill material contained within each trench of said first set of trenches” (see claim 22, step (d), (iii)).

### **Claim Rejections - 35 USC § 102**

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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5. Claims 19, 21-24, 27, 29 and 30 are rejected under 35 U. S. C. 102(b) as being anticipated by Karlsson et al. (US Pat. 6,124,183, hereinafter Karlsson).

Regarding claim 21-24, 27 and 29, Karlsson in figs. 2D-2J discloses a method of fabricating a filled trench structure, comprising:

(a) forming a planarization stop layer 203 on a top surface of a substrate 201 (fig. 2D);

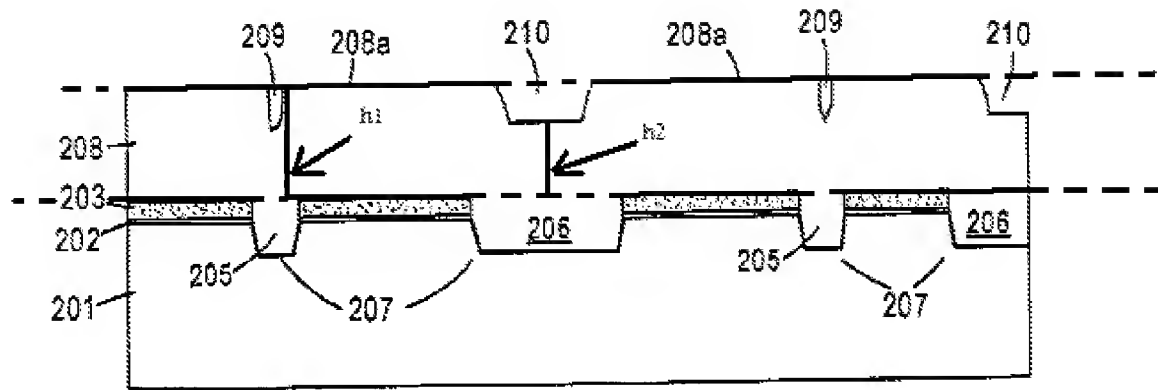
(b) forming a first set of trenches 205 in a first region of planarization stop layer 203 and substrate 201 and forming a second set of trenches 206 in a second region of planarization stop layer 203 and substrate 201, trenches in first set of trenches 205 having a higher aspect ratio than trenches 206 in second region (fig. 2E);

(c) depositing a layer of a fill material 208 in and over first and second sets of trenches and on a top surface of planarization stop layer 203, fill material 208 completely filling each trench of first set of trenches 205 and completely filling each trench of second sets of trenches 206 (fig. 2F), a first thickness of layer of fill material directly over each trench of first set of trenches is **inherently** greater than a second thickness of layer of fill material directly over each trench of second set of trenches 124 {see **Spikes (US Pat. 5,981,354); col. 5, line 64 through col. 6, line 12 and Kuroi et al. (US Pat 5,889,335); fig. 27, col. 9, lines 55-65**}

(d), after (c):

(i) forming a mask layer 211 on layer of fill material 208 (fig. 2H);

(ii) forming a opening in mask layer 211 in first region and over trenches of first set of trenches (fig. 2H);



**Figure 2G**

(iii) removing a layer of fill material 208 exposed in opening, fill material 208 still completely filling each trench of first set of trenches, after removing a layer of fill material 208, fill layer of material 208 thicker over planarization stop layer 203 (t3) between adjacent trenches of first set of trenches 205 than over fill material contained within each trench of said first set of trenches (208 material inside trench 205; t4) (col. 5, line 54-60 and fig. 2I); and

- (iv) removing masking layer 211 (col. 5, line 60); and

(e) after step (d), removing, using a planarization process (fig. 2J and col. 5, lines 60-65), all of fill material from top surface of planarization stop layer and over first and second set region, fill material still completely filling each trench of first set of trenches and each trench of second set of trenches, a top surface of fill material in first set of trenches and a top surface of fill material in second sets of trenches co-planer with top surface of planarization stop layer.

Regarding claim 19, at some point during the removing process,  $t_1 = t_2$  (when the layer 208 having a substantially planar upper surface).

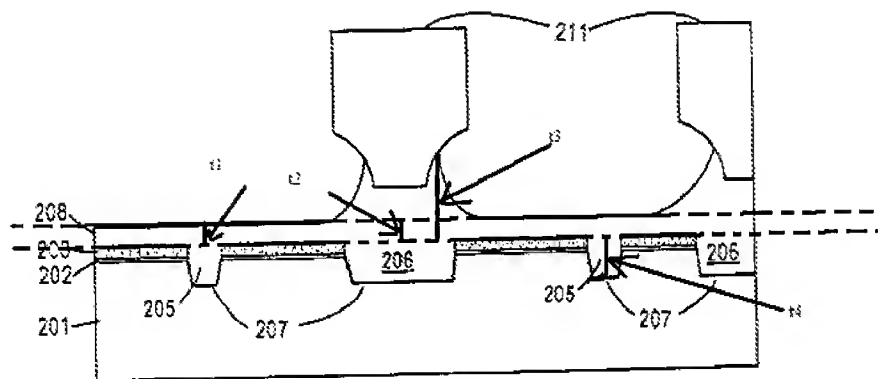


Figure 2I

Regarding claim 30, Karlsson discloses fill material is selected from the group consisting of: high-density plasma oxide, low-pressure chemical vapor deposition oxide, tetraethoxysilane oxide (col. 5, lines 27-35).

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 20 and 28 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Karlsson (US Pat. 6,124,183).

Karlsson fails to disclose the fill material is removed about 5 to 20% of the as deposited thickness (claim 20); and the aspect ratio of the first/second trenches (claim 28). It would have been obvious to one with ordinary skill in the art at the time of the invention to perform an etched back process step as taught by Karlsson. The amount of the fill material being etched and the aspect ratio of the first/second trenches does not define patentable over Karlsson since it is well known processing variable and the discovery of the optimum or workable range involves only routine skill in the art. The



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specific amount of the semiconductor being etched does not provide any critical or unexpected results to the method of manufacturing a semiconductor device. Rather, it is merely an obvious selection of the etching amount based on desired functional characteristics determinable by routine experimentation. *In re Aller*, the court stated, "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456 105 USPQ 233,235 (CCPA 1995).

### **Response to Arguments**

7. Applicant's arguments with respect to the pending claims have been considered but are moot in view of the new ground(s) of rejection. Although the same reference is applied (Karlsson), the rejections are based on a new interpretation of that reference. Therefore, the arguments presented in response to the interpretation used in the previous Office Action are no longer applicable.

### **Conclusion**

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The art cited on the *Notice of References* is included as teaching the general state of the art relating to the instant invention.

**US Pat. 7,078,314** (Kim et al.) is cited as teaching a memory device having a periphery isolation region and core isolation region. A core trench having an aspect ratio

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of approximately 7.0-8.0 or more and a periphery isolation trench having an aspect ratio of approximately 7.0-8.0 or less (col. 13, lines 12-13 and lines 56-57).

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Vu whose telephone number is (571) 272-1798.

The examiner can normally be reached on Monday-Friday from 8:00am to 5:00pm. If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Loke H can be reached on (571) 272-1657. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR, Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/DAVID VU/

Primary Examiner, Art Unit 2818